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ultimate difficulties which were involved in the religious philosophy of the old?

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Identité et Realité. Par ÉMILE MEYERSON. Deuxième Édition. Revue et Augmentée. Paris, Félix Alcan, 1912.—pp. xix, 535.

The first edition of this important book was published in 1908. In the present edition the work has been augmented by one hundred pages.

The work is a discussion of the fundamental epistemological principles of the physical sciences in the light of their history. The philosophical principles of biology and psychology are only incidentally dealt with. Professor Meyerson works out, with admirable clearness and with abundant illustration, his general view of the leading principles of physical science. The most striking feature of his book is its very thorough and exhaustive historical documentation. He seems to have a complete and ready command of the history of the physical sciences as well as of the history of philosophy. No less than four hundred and sixty-seven authors and schools of thought are either cited or referred to and always, so far as I am able to judge, with pertinency to the points under discussion. I know of no writer in this field since Whewell who shows so much learning. The student of the logic of the physical sciences will find the book a rich mine.

The book begins with an examination of the theory advanced by Comte, and in our own day most notably represented by Mach, that science has, or should have, no other task than to determine descriptively the *laws* of phenomena with a view to prevision and action. M. Meyerson contends, very justly I hold, that the principle of *legality* alone furnishes a very insufficient conception of the aims of science. Science seeks to *explain* phenomena *causally*, and all explanation consists in establishing the identity of antecedent and consequent. This is the scientific conception of causality, which thus aims at the reduction of all difference to identity and would issue, if completely achieved, in the elimination of time and change. Progress towards this aim means the triumph of mechanical methods and principles of explanation, and M. Meyerson holds that mechanism has proved to be by far the most fruitful method of science. Science will continue to follow this road, although it will always be confronted by an irreducible and irrational factor in experience. The most widespread, persistent, and fruitful mechanical conception in the history of science is *atomism*. The origin and persistence of atomism is due to the fact that it is an expression of the causal principle of identity in time in the form of an explanatory ground of the discreteness of phenomena in terms of a fundamental discreteness in mass, motion, and arrangement in space. The concept of action at a distance is antispatial and is thus unsatisfying from the mechanical standpoint. On the other hand, the concept of atoms in immediate impact communicating motion leaves something unintelligible on our hands. The *principle of inertia*, which was unknown to the ancients, emerges in modern thought as a special form of the doctrine of the conservation of motion, that is, as an application to motion of the postulate of identity in time. The principle of inertia has not been demonstrated *a priori* and it can hardly be regarded as a truth established by experience. It is a plausible application of the assumption that velocity persists in time. The ancients did not distinguish between mass and weight and yet the Epicureans postulated the *Conservation of Matter*. There are three distinct notions here—matter, weight, and mass. Weight is a purely empirical notion, whereas mass is a necessary convention of thought. The Conservation of Matter is not established beyond peradventure by experience, since even at the present time the determination of atomic weights is only approximate. Like the principle of inertia, the conservation of mass is a plausible principle applied to phenomena as a deduction from the principle of causality. The electric theory of matter shows that it is not *a priori*. The ether again is an imponderable mass—a conventional concept deduced from the principle of identity. The doctrine of the *Conservation of Energy* is likewise a plausible application to phenomena of the postulate of identity of cause and effect in the temporal series. Energy is itself a conventional concept. The theory of its conservation expresses the belief or postulate that in all change there is a substance or something which remains constant.

The examination of the fundamental principles of science thus shows that mechanical explanation involves the elimination of time, change, and diversity. Cause and effect are the same. Nothing really changes. An examination of the concept of the *Unity of Matter* gives further illustration of the tendency of exact science to eliminate all differences. The reduction of matter to ether means making it equivalent to space. The one common feature of the different ethers is that they fill space. Ether is space. Rational mechanics treats phenomena as reversible. The *principle of Carnot*, that is, the second law of thermodynamics or the law of *Entropy*, involves the irreversibility of natural phenomena and thus comes into conflict with the law of causality as identity in time. The ultimate outcome of mechanism is the reduction of reality to the non-existent. The principle of Carnot, on the other hand, is more in accord with the empirical character of reality.

Mechanism fails to account for sensations. There is an unavoidable contradiction in this respect between the quantitative identity without qualitative diversity which the intellect seeks in science, and the qualitative diversity of sense perceptions. There is an irreducible irrationality in actual experience. This opposition of quantity and quality is further shown in the various attempts at non-mechanical explanations, in the qualitative theories of matter from Aristotle down through the Alchemists, and the *phlogiston*, *metallicity*, and other theories of modern chemistry, to Ostwald's theory of Energy. These qualitative theories have, however, proved relatively sterile in scientific investigation. Mechanism is a more complete and rigorous expression of the principle of identity, and the latter is the directing principle of science. Common sense supposes that sensations exist when they are not perceived, and, in its theories of material substance and causal explanation substitutes one type of sensation for another, for example, touch and movement for color and sound. The scientific doctrines of atomism, movement, mass, energy, etc., are simply more exact and rigorous applications of the principles of common sense thinking to phenomena. Professor Meyerson concludes that it is vain to seek to eliminate causal explanation from science. Positivism errs in confusing legality and causality and in making the latter only a case of the former.

Law and cause are both postulates or *a priori* principles of rational interpretation. There is a partial agreement or correspondence between thought and reality. The signal success of mechanism as a principle of explanation is proof that this agreement goes beyond mere legality. In part sense experience does submit to causal explanation. But the establishment of absolute identity of phenomena in time and space is blocked by two enigmas which science cannot unravel—transitive action and the irreducible diversity of sensations. In these respects reality is irrational. The principles of science are plausible and useful but not all-sufficient. Reality may transcend mechanism. Absolute identity in time, absolute quantitative constancy and uniformity may be only appearances. Nature may be subject to law, it may be orderly, and yet not be wholly explicable in terms of mechanism or causality. If nature were wholly intelligible, without any irrational surd, all its diversity and changefulness would disappear in an abstract identity. We cannot, then, deduce from the postulate of legality the absolute persistence of a quantitatively identical substance in which all qualitative diversity is swallowed up.

I have given only a rapid and superficial survey of this solid and informing book. M. Meyerson's affinities will be obvious to readers of contemporary French thought. He especially mentions his indebtedness to Messieurs Boutroux, Bergson, Duhêm and Poincaré. It is not possible in this review to enter into detailed criticism. I would, however, raise the question whether the conception of identity which M. Meyerson employs is really the one upon which all science proceeds. I am not ready to admit that this is the case. In any event I should hold that it is a onesided, and, hence, erroneous theory of identity. What the reason most significantly seeks is identity in difference, not abstract or equational identity, and the best types of scientific explanation are true to this principle. The true theory of identity was first broached by Plato, partially developed by Spinoza, more fully by Hegel, and among English writers has been most adequately stated by Bosanquet.

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Philosophische Abhandlungen, Hermann Cohen zum 70sten Geburtstag (4 Juli 1912) dargebracht. Berlin, Bruno Cassirer, 1912.—pp. vi, 359.

This book, consisting of twenty essays written in large part by former pupils of Professor Cohen, of Marburg, is an admirable act of piety. The dedication signed by Professor Natorp in the name of his fellow authors expresses clearly, what has come to be felt everywhere in the philosophical world, that there is indeed a Marburg School whose founder and leader is Hermann Cohen, a school united in its ideal of a system of philosophy and in its use of a philosophical method. To quote the words addressed to the leader: "Under especially difficult conditions not only have you maintained the study of philosophy at the university to which you have devoted nearly forty years of your life, but you have greatly advanced the cause of this study. Your own temperament and your regard for Plato led you from the beginning to adopt as your method of instruction the διαλέγεσθαι and so to found our philosophical seminar. In doing this you have erected for yourself a permanent memorial. Moreover, unintentionally yet of necessity, you have called into being a school of